vi. Helium Inventory for RHIC

In order to properly plan gas and liquid helium storage facilities for RHIC it is necessary to identify the quantity of helium contained by each component of the accelerator. The current estimate for the system-wide inventory requirements are summarized in Table 3-10.

An existing gas storage facility located at Building 919 will be used for storage of helium from the system. The capacity of this facility is about 70 thousand standard m^3 at a pressure of 60 bar.

A 110,000 liter liquid helium storage dewar will be purchased to increase the storage capability. This will add the equivalent of 70 thousand standard m^3 to the storage capacity and also permits saving liquid helium during warmup which can be used to speed cooldown at a later time. This will be especially useful during the warmup of a single sextant for repairs.

Intermediate pressure tanks will be used to provide temporary gas storage. Some tanks (capacity: 110,000 liter, 15 bar working pressure) are already on hand and others will be added as required. Storage at this pressure is very useful because the gas can be returned to storage without need for a compressor by merely equalizing the pressure in the magnets with these tanks.

Table 3-10. Estimated Helium Inventory

	Physical Volume (liter)	Equiv. Liquid Helium Vol. (liter)	Equiv. Vol. at Std. Cond. 1 atm, 298 K (1000 scf)
I - MAGNET COOLANT LOOP			
Regular Arc Components			
288 Dipole Assemblies	34560	39537	1067
276 CQS Assemblies	20700	23681	639
Sum for Magnet Interconnects	2096	2397	65
Insertion Region Components			
Dipoles			
12 DX Magnets	996	1139	31
24 D0, D5, D6, D8 Assemblies	8424	9637	260
Quadrupoles			
24 Q1-Q9 Assemblies	14688	16803	454
Sum for Magnet Interconnects	4606	5270	142
Vacuum Jacketed Piping			
Sum for Q3-Q4	7685	8792	237
Sum for D0-D0	8128	9299	251
15 Lead Pots	2465	2819	76
56 Cold/Warm Transitions	627	718	19
II - PIPING SYSTEM			
In Ring - 8710 m			
Recooler Supply	32388	37052	1000
Recooler Return	32388	5182	140
Utility Header	32388	5182	140
Shield	20933	3481	94
Refrigerator to Ring - 387 m			
Supply	2180	2494	67
Return	8049	1288	35
Shield	7367	1179	32
III - OTHER RING COMPONENTS			
12 - 225 W Recoolers	5220	5220	141
60 - 50 W Recoolers	2094	2396	65
Cold Gas in Storage Tanks	130000	17000	459
Refrigerator Work Inventory		23926	646
Working Margin		18768	507
Gas Storage Tare Volume	3398400	4889	132
TOTAL INVENTORY IN EQUIV. LIQ. LITERS		248148	
TOTAL INVENTORY IN 1000 scf			6700
IN STANDARD m^3			189723
TOTAL INVENTORY IN kg		31019	